INERT LANDFILL AND MATERIALS RECOVERY / RECYCLING FACILITY

Ballinclare Quarry, Kilbride, Co. Wicklow

ENVIRONMENTAL LIABILITY RISK ASSESSMENT (ELRA)

Prepared for: **Kilsaran Concrete Unlimited Company**

SLR Ref: 501.00036.00080
Version No: Rev 0
February 2023

BASIS OF REPORT

This document has been prepared by SLR Consulting Limited with reasonable skill, care and diligence, and taking account of the manpower, timescales and resources devoted to it by agreement with **KILSARAN CONCRETE UNLIMITED COMOPANY** (the Client) as part or all of the services it has been appointed by the Client to carry out. It is subject to the terms and conditions of that appointment.

SLR shall not be liable for the use of or reliance on any information, advice, recommendations and opinions in this document for any purpose by any person other than the Client. Reliance may be granted to a third party only in the event that SLR and the third party have executed a reliance agreement or collateral warranty.

Information reported herein may be based on the interpretation of public domain data collected by SLR, and/or information supplied by the Client and/or its other advisors and associates. These data have been accepted in good faith as being accurate and valid.

The copyright and intellectual property in all drawings, reports, specifications, bills of quantities, calculations and other information set out in this report remain vested in SLR unless the terms of appointment state otherwise.

This document may contain information of a specialised and/or highly technical nature and the Client is advised to seek clarification on any elements which may be unclear to it.

Information, advice, recommendations and opinions in this document should only be relied upon in the context of the whole document and any documents referenced explicitly herein and should then only be used within the context of the appointment.

CONTENTS

TABLES

FIGURES

Executive Summary

Activity Details

Name	Ballinclare Quarry Inert Landfill and Materials Recovery / Recycling Facility
Address	Kilbride, Co. Wicklow
Licence No.	TBC
Licensee	Kilsaran Concrete Unlimited Company (hereinafter 'Kilsaran')

Activities to be Licensed

Class D1 : Deposit in, on or under land. This activity principally provides for used of inert soil and stone to backfill the former quarry void.

Class D5 : Specially engineered landfill, (e.g. placement into lined discrete cells which are capped and isolated from each other and from the environment (Principal Activity). This is the principal waste activity and references the requirement for basal and side liners as part of the overall phased development of the landfill.

Class D15 Storage pending any of the operations numbered D1 to D14 (excluding temporary storage (being preliminary storage according to the definition of "collection" in Section 5(l), pending collection on the site where the waste is produced. This provides for on-site storage of materials pending disposal to landfill. This activity provides for stockpiling of inert wastes prior to placement and final disposal at the inert landfill.

Class R3: Recycling/reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes), which includes gasification and pyrolisis using the components as chemicals.

Class R5 (P): Recycling/reclamation of other inorganic materials, which includes soil cleaning resulting in recovery of the soil and recycling of inorganic construction materials.

Class R13: Storage of waste pending any of the operations numbered R 1 to R 12 (excluding temporary storage (being preliminary storage according to the definition of 'collection' in section 5(1)), pending collection, on the site where the waste is produced).

Report Preparation

This Environmental Liability Risk Assessment (ELRA) in respect in respect of the proposed inert landfill and material recovery / recycling facility at Ballinclare Quarry, Kilbride, Co. Wicklow has been independently prepared by SLR Consulting Ireland, 7 Dundrum Business Park, Windy Arbour, Dublin 14.

Comparison with Previous Plans

This risk assessment is the preliminary draft ELRA which has been prepared in support of a waste licence application to the Environmental Protection Agency (EPA) by Kilsaran. It is anticipated that this risk assessment will be updated and amended in light of specific conditions applied by any waste licence issued by the EPA in respect of the proposed inert landfill and materials recovery / recycling facility at Ballinclare Quarry in due course.

Overview of the Plan

This ELRA has had regard to the requirements outlined in the EPA publication, *Guidance on Assessing and Costing Environmental Liabilities (2014).*

Cost Summary

As a result of this assessment, and based on a plausible worst-case scenario, a requirement for financial provision of **€1,064,400** (including 20% contingency) has been calculated for the proposed inert landfill and material recovery / recycling facility at Ballinclare Quarry. This amount is deemed to be the maximum environmental liability which could arise from the operation of the facility.

Financial Provision

Arising out of this assessment, Kilsaran is prepared to make the required financial provision in respect of potential environmental liability by maintaining environmental liability insurance cover in excess of the assessed amount.

Review

This ELRA will be reviewed annually and updated where necessary to take account of any facility or process changes, technology changes and costing changes (inflation). Details of the review and updates (if any) shall be included in future Annual Environmental Report (AER) submissions to the EPA.

1.0 INTRODUCTION AND BACKGROUND

1.1 Ballinclare Inert Landfill and Materials Recovery/Recycling Facility

In April 2021 Kilsaran Concrete Unlimited Company (hereinafter 'Kilsaran') applied to An Bord Pleanála for Strategic Infrastructure Development at Ballinclare Quarry, Kilbride, Co. Wicklow comprising

- an inert landfill facility which would provide for backfilling of the existing quarry void to original (pre-development) ground level using imported inert soil and stone waste;
- progressive restoration of the backfilled quarry to long-term grassland / scrub habitat, similar to that which existed prior to the quarry development
- establishment and operation of a construction and demolition (C&D) waste recovery / recycling facility across the footprint of a pre-existing concrete blockyard at the quarry; and
- installation and operation of a soil washing plant at the former concrete / asphalt production yard to recover sand and gravel aggregate from imported soil and claybound / intermixed wastes. The recovered materials will be supplied for subsequent use in the production of construction materials.

It is anticipated that any inert soil and stone or C&D waste to be imported, managed and handled at the facility will be generated by construction projects in the eastern part of the country, principally in Counties Wicklow, Dublin and Wexford.

The principal non-soil and stone / C&D wastes to be recovered / recycled at the facility will include solid concrete (ready-mixed, reinforced, blocks and/or pavement slabs), bricks, ceramics and solid bituminous waste mixtures (hardened asphalt returns and road planings). These materials will be processed (crushed and screened) and supplied as recycled (secondary) aggregates to the construction market, subject to any relevant End of Waste criteria set by the Environmental Protection Agency (EPA).

It is envisaged that C&D waste recovery / recycling activities will continue for the duration of the landfilling operations and follow-on restoration works and that planning permission for the activity will expire thereafter, unless otherwise renewed by the company / Planning Authority.

The soil washing plant to be installed at the facility will effectively recover sand and gravel and secondary aggregates from selected, more granular soil waste and mixed, clay bound construction and demolition waste imported to the facility. Soil washing activities will also continue in operation up to the final phase of the proposed landfill development which will extend across the former concrete / asphalt production area.

When fully operational, the proposed development will provide for the following:

- Backfilling of the existing void at Ballinclare Quarry to original ground level through the development and operation of an inert waste landfill facility. The landfill will have a total intake capacity of approximately 6,165,000 tonnes, comprising inert, primarily soil and stone, waste and non-waste soil and stone by-product
- Progressive restoration of the backfilled landform to long-term scrub / grassland habitat;
- Continued use of existing site infrastructure and services including, site / weighbridge office, staff welfare facilities, wastewater treatment system, outbound weighbridge, garage / workshop, wheelwash, hardstand areas, fuel and water storage tanks to service the proposed development;
- Installation of a new weighbridge along the inbound lane of the quarry access road, and installation of a new wheelwash along the egress route leading off-site;

- Decommissioning of any remaining fixed plant and infrastructure associated with former rock extraction activities or with aggregate, concrete and asphalt production activities at the site;
- Off-site removal of any materials or bulky wastes associated with former quarrying and production activities;
- Construction of an industrial shed (portal frame structure) at the paved blockyard area to house crushing and screening equipment and to process / recycle C&D waste (principally concrete, bricks, ceramics and solid bituminous waste mixtures);
- Use of any external paved area surrounding the C&D waste processing shed as a hardstanding area for the external handling and storage of both unprocessed and processed C&D wastes;
- Separation of any intermixed C&D wastes (principally metal, timber, PVC pipes and plastic) prior to its off-site removal to authorised waste disposal or recovery facilities;
- Installation and operation of a soil washing plant at the former concrete / asphalt production yard to recover sand and gravel and secondary aggregates from natural soil and stone waste or intermixed claybound / C&D wastes for subsequent use in the production of construction materials;
- Construction of an on-site (passive) wetland treatment system and attendant drainage infrastructure to treat surface water run-off / groundwater collecting in the sump / floor of the quarry area during landfilling operations and any surface water run-off arising over the C&D waste recovery / recycling area prior to its discharge off-site;
- Re-use of an existing storage shed as a dedicated waste inspection and quarantine facility to inspect and store suspect waste consignments as required;
- Upgrading and ongoing maintenance of established internal haul roads across the site;
- Temporary stockpiling of topsoil pending re-use as cover material for phased and/or final restoration of the inert landfill / backfilled quarry; and
- Environmental monitoring of noise, dust, surface water and groundwater for the duration of the landfilling and restoration works and C&D waste recovery / recycling activities, and for a short period thereafter.

All traffic to and from the proposed waste facility at Ballinclare Quarry will be routed along the L1157 Local Road. Following discussions with the Roads Authority, provision is made for road improvements along the length of the L1157 leading up to the quarry access, including road widening to 6.0m over most of the route length (within the existing road curtilage), with road strengthening and repair overlay and road markings.

1.2 Site Description

The site to which this ELRA refers is located at Ballinclare Quarry and comprises a former rock quarry and tied manufacturing facilities. The quarry lies approximately 2.5km to the north-west of the small settlement of Kilbride and 2.5km south of the village of Glenealy. The quarry location is indicated on an extract from the Discovery Series 1:50,000 map of the area in Figure 1 and the Ordnance Survey map of the area in Figure 2.

The overall Kilsaran land ownership area at Ballinclare Quarry extends to c.36 ha (89 acres), while the prospective waste licence area covers approximately 32.5ha (78.3 acres). The Applicant's landholding is shown edged blue in each figure, while the extent of the waste licence application area shown edged red.

Figure 1
Site Location – Discovery Series Map

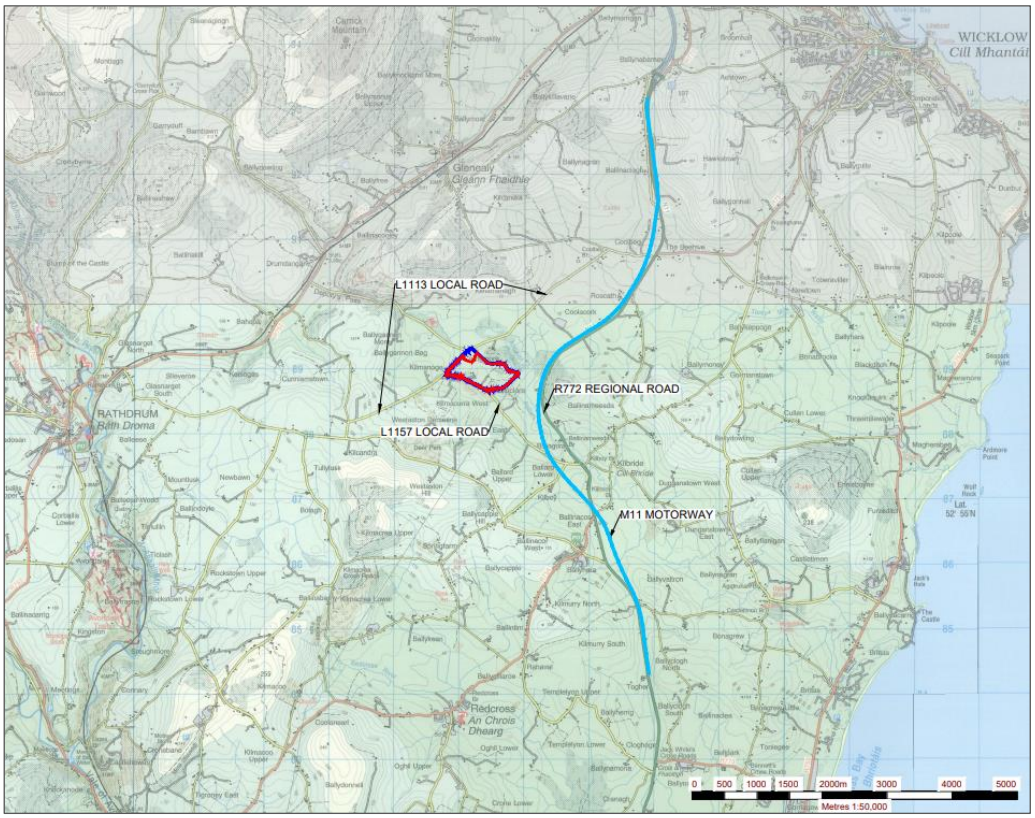
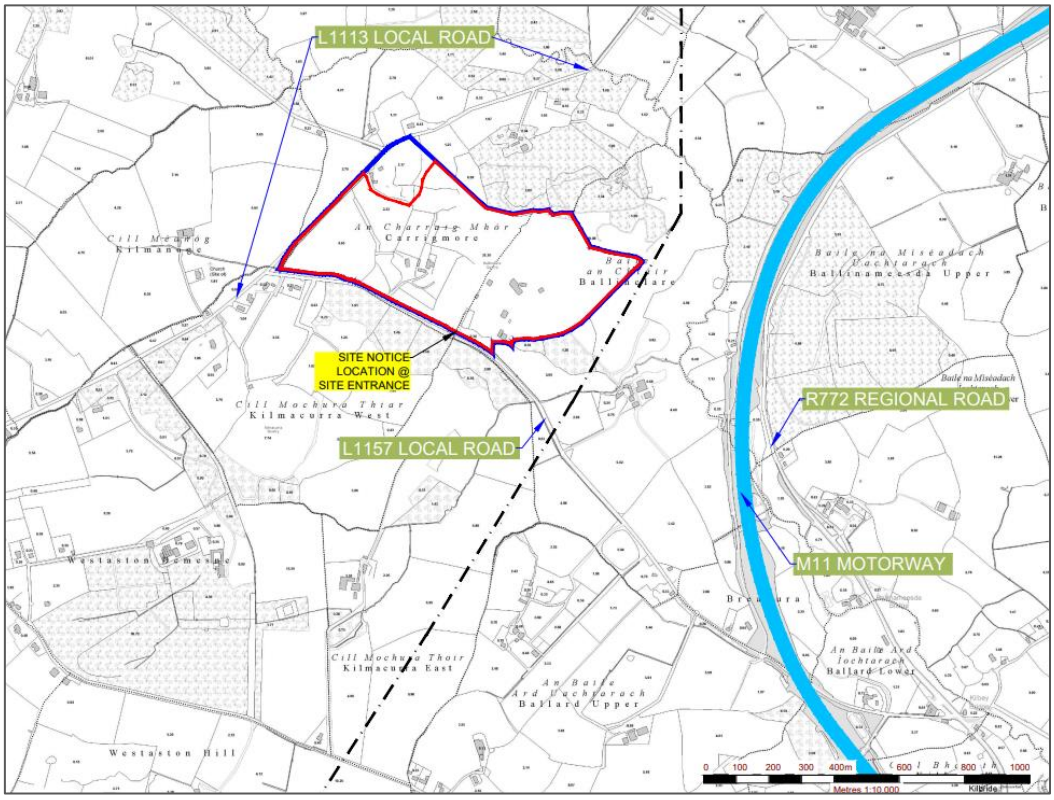


Figure 2
Site Location – Ordnance Survey Map



The site straddles two townlands, Ballinclare and Carrigmore, and extends across the former quarry footprint and includes the former concrete / asphalt production area, a recently constructed paved concrete block yard, established site buildings and infrastructure and a network of settling ponds in the north-western corner.

Ground levels in the vicinity of the quarry vary between 55mOD to 60mOD along the southern site boundary, close to the L1157 Local Road and rise to 90mOD at the highest point along the northern boundary where the main quarry face cuts into a rock slope which rises northwards. Typical ground levels along the northern quarry boundary range from 50mOD to 70mOD.

Extraction across the quarry generally extended to a floor level of approximately 37mOD. At the time of its closure, wo active quarry benches were being extended westwards. As a result the quarry floor is locally higher at the western end, where the first bench has only been developed to a level of approximately 52mOD. The quarry floor is also locally deeper in the central eastern area of the quarry area and extends to approximately 22mOD where a third bench was commenced. This area acted as the quarry sump when it was operational.

The quarry is accessed via a 120m long surfaced entrance road leading off the L1157 Local Road, known locally as the Breagura Road. The former concrete batching plant, aggregate plant and asphalt plant were located to the south-east of the quarry holding, east of the access road, in an area where rock was previously excavated to a relatively shallow depth (of between 5m and 10m).

Established ancillary facilities at the quarry include the main site office, a weighbridge and adjoining weighbridge office, staff canteen and toilets, a wastewater treatment system, a wheelwash, a bunded fuel storage area, a garage / workshop and a laboratory.

A number of former farm buildings and a storage yard are in place to the west of the site access road, together with a recently constructed concrete block yard. The farm buildings comprise a stone barn and two concrete walled barns, each with a corrugated tin roof. A more modern brick-built two-storey building is also present in this location. The existing / planned development layout at Ballinclare Quarry is shown in Figure 2.

When it was operating, the quarry at Ballinclare was effectively worked dry, with very little inflow of groundwater recorded into the quarry void. A sump was located at the lowest point on the quarry floor and principally collected any surface water falling over the excavation area, as well as any minor inflows of groundwater which may have arisen.

The water collecting in the sump was periodically pumped to water storage tanks for subsequent re-use in concrete production on-site or for dust suppression. Any surplus water was pumped off-site via a surface water treatment system (a number of excavated ponds in series) to a drainage channel which flows to the Ballinclare Stream immediately beyond the north-western site boundary.

1.3 Surrounding Area

The area surrounding Ballinclare Quarry is typically rural in character and dominated by forestry and undulating agricultural land. Ground level in the vicinity of the application site generally lies between 60mOD and 70mOD. Ground levels rise in a south-westerly direction to c.270mOD at Westaston Hill (approximately 2km SW) and in a northerly direction to 217mOD at Ballincooley Hill (approximately 1.75km N).

The Potters River flows approximately 450m beyond the northern boundary of the application site and then turns south-eastwards and flows approximately 250m to the east of the landholding. Thereafter it continues south-eastward and eventually discharges to the sea at Brittas Bay.

1.4 Classes of Licensed Waste Activities

Any waste licence issued to be issued to Kilsaran by the Environmental Protection Agency (EPA) is expected to provide for the following licensed activities (according to the Third and Fourth Schedules of the Waste Management Acts 1996-2022).

- Class D1 : Deposit in, on or under land. This activity principally provides for used of inert soil and stone to backfill the former quarry void.
- Class D5 (Principal Activity) : Specially engineered landfill, (e.g. placement into lined discrete cells which are capped and isolated from each other and from the environment (Principal Activity). This is the principal waste activity and references the requirement for basal and side liners as part of the overall phased development of the landfill.
- Class R3 : Recycling/reclamation of organic substances which are not used as solvents (including composting and other biological transformation processes), which includes gasification and pyrolisis using the components as chemicals.
- Class R5 : Recycling/reclamation of other inorganic materials, which includes soil cleaning resulting in recovery of the soil and recycling of inorganic construction materials.
- Class R13 : Storage of waste pending any of the operations numbered R 1 to R 12 (excluding temporary storage (being preliminary storage according to the definition of 'collection' in section 5(1)), pending collection, on the site where the waste is produced).

The planning (SID) application in respect of the proposed development at Ballinclare Quarry (ABP Ref. No. PL27.309991) provides for a maximum combined maximum waste intake to the facility of 800,000 tonnes per annum. The application further limits the number of HGV traffic movements in (and out) of the facility to 150 per day (in line with the existing quarry planning permission).

Within the annual intake limit, provision is made in the EPA waste licence application for importation of up to 400,000 tonnes of potentially recoverable claybound C&D waste to be supplied as feedstock to the soil washing plant and for up to 100,000 tonnes of source segregated C&D waste.

1.5 Scope of this ELRA

This plan identifies and addresses any potential risks to the environment and associated liabilities arising from future activities at the proposed inert landfill and materials recovery / recycling facility at Ballinclare Quarry.

Planned liabilities associated with the closure of the facility are not considered in this Environmental Liabilities Risk Assessment (ELRA) and have been identified and costed separately in the preliminary Closure, Restoration and Aftercare Management Plan (CRAMP) prepared in respect of the proposed development.

2.0 CHARACTERISATION OF LOCAL ENVIRONMENT

2.1 Site Development History

While it is unclear when extraction activities first commenced at Ballinclare Quarry, it is known that it pre-dated the commencement of the first Planning and Development Act and its attendant regulations in 1964.

The quarry was registered with Wicklow County Council (WCC) on 4 March 2005 by the quarry owner and operator at the time, S.M. Morris Ltd, as was required under Section 261 of the Planning and Development Act of 2000 (WCC Quarry Ref. QY/4). Arising out of the quarry registration process, the operator was directed by Wicklow County Council to submit a planning application for retention of the quarry and related site development.

A planning application was subsequently submitted in January 2007 for retention of quarrying and related activities (over 13.4 hectares) including extraction areas, processing areas, stockpiling areas, stone crushing and screening plant, concrete and asphalt production plants, structures and associated site infrastructure. Retention planning permission was granted by Wicklow County Council in February 2008, subject to 39 conditions (Planning Ref. 07/45)

The quarry was temporarily closed in 2009 following the downturn in activity in the Irish construction industry which followed the Global Financial Crisis of 2008. The quarry reopened again in 2014 following its acquisition by Kilsaran.

In December 2014, Kilsaran sought planning permission for the continuation of previously permitted development at the quarry for a period of 25 years which included a readymix concrete plant and an asphalt manufacturing plant. Permission was sought for a revised extraction scheme which provided for deepening of the quarry to a floor level of +1mOD over an extended extraction area of 16.5 hectares, an aggregate washing plant, replacement of the pre-existing asphalt plant, a concrete block manufacturing plant and concrete block manufacturing yard and an increase in quarry output to c. 800,000 tonnes per annum. Planning permission was granted by Wicklow County Council subject to 23 conditions in January 2016 (Planning Ref. 14/2118).

Extraction and production activities at the quarry ceased in June 2016 following the discovery of small quantities of naturally occurring asbestos (NOA) in the diorite bedrock being quarried at the time. Since then, and following the cessation of quarry dewatering, the water level in the quarry void has risen to cover the quarry floor. There is no risk to public health associated with the exposures of naturally occurring asbestos, as it tightly bound within the host rock formations at Ballinclare.

2.2 Operator Performance

2.2.1 Environmental Management Systems

Kilsaran implements an Environmental Management System (EMS) in respect of its core quarrying and construction material production activities at quarries and production facilities across Ireland. In recent years, as it has moved to embrace materials recycling and recovery and to support the development of the circular economy, the company has extended the scope of its EMS to encompass inert landfilling and materials recovery / recycling activities. As part of its EMS, Kilsaran has developed standard procedures to address waste intake and acceptance procedures and waste handling activities, as well as an enhanced emergency response plan.

2.2.2 Compliance History

As previously noted, planning permission for a quarry extension and associated development was granted by Wicklow County Council subject to 23 conditions in January 2016 (Planning Ref. 14/2118).

Quarrying, aggregate and concrete production at Ballinclare have always operated in compliance with necessary permits and planning consents and Kilsaran has not been subject to any enforcement action by the Local Authority.

Kilsaran has never been convicted of any offence under the Waste Management Acts 1996-2022, the Environmental Protection Agency Act 2003 or the Air Pollution Act 1987.

2.2.3 Incident History

Insofar as the Applicant is aware, no significant environmental incidents have arisen in the course of on-site operations at Ballinclare Quarry, either prior to, or since it acquired the site in 2014. Specifically, there is no record of any significant fuel leak or spill having occurred.

2.2.4 Environmental Monitoring

When the quarry was operational previously, there was an established programme of environmental monitoring in connection with extractive and concrete / asphalt production activities. Much of the monitoring infrastructure remains in place and was used to obtain updated monitoring data to support the ongoing planning and waste licence applications.

Kilsaran will establish an environmental management programme to monitor and manage emissions from the proposed waste facility at Ballinclare Quarry, in line with the requirements of any planning permission issued by An Bord Pleanála and/or a waste licence issued by the EPA. At present, and subject to approval of regulatory authorities, it is anticipated that most of the pre-existing monitoring infrastructure will be brought back into operation / service.

It is expected that limit values for environmental emissions generated by proposed waste disposal and materials recovery / recycling activities at Ballinclare Quarry will be similar to those applied to other EPA licenced facilities. Environmental sampling, monitoring and testing will be undertaken by Kilsaran personnel and/or specialist contractors appointed by it. Records of environmental monitoring and testing will be maintained on-site and forwarded to the EPA and Wicklow County Council as required under the terms of any grant of planning permission and/or waste licence issued in respect of the proposed waste facility.

2.3 Environmental Sensitivity

2.3.1 Geology

Soils

The EPA website publishes soils and subsoils maps created by the Spatial Analysis Unit of Teagasc in collaboration with the Geological Survey of Ireland and the Forest Service. This mapping indicates that the soils which previously occurred around the site at Ballinclare Quarry comprised:

- Acid Brown Earths and Brown Podzolics around the existing treatment ponds / grassland area – these are shallow well drained soils, largely derived from siliceous parent material (e.g.,. diorite and sandstone);
- Lithosols and Regosols, around the quarry / development footprint – these are deep, well-drained soils derived mainly from shales and sandstones; and
- Surface water and Groundwater Gleys along the eastern site boundary – these are shallow, poorly drained soils derived from bedrock at or close to surface.

Across the proposed landfill area, the soils have been removed as part of past quarry development.

Subsoils

The published subsoil map for the area around the site indicates that shallow bedrock occurs over much of the northern and eastern area and that the south-western area of the site is underlain by till derived from lower Palaeozoic sandstone and shale. As with soils, subsoils have previously been removed across the existing quarry development footprint to facilitate the extraction and processing of rock.

Till generally occurs in the lower lying areas beyond the site, while rock outcrops at or close to the surface on locally higher ground. Mapping indicates that areas of alluvial soil occur along the Potters River approximately 200m to the north and west of the site and approximately 300m to the south and east of it.

Bedrock Geology

The Geological Survey of Ireland (GSI) 1:100,000 regional bedrock map, indicates that the quarry at Ballinclare is developed within Silurian Intrusive Diorite. The diorite body in which the quarry is developed is identified as the Carrigmore Diorite and is described as massive, uniform dark grey-green, fresh, very strong diorite.

The diorite is indicated by the GSI as occurring at the centre of a volcanic intrusion, grading outwards to a quartz-diorite at the intrusion margins, although diorite is also recorded at the south-eastern part of the intrusion and granodiorite at the south-western part. The intrusion extends approximately 1.9km from west to east and 2.1km from north to south.

The south-western corner of the site is underlain by the Kilmacrea Formation, described as a dark grey slate, with minor pale sandstone. The GSI 1:100,000 scale regional bedrock map indicates that there is faulting at the contact between the Kilmacrea Formation and the Diorite.

Examination of the exposed quarry faces at Ballinclare confirms that the quarry is entirely developed within massive Silurian Diorite. One thin zone of sheared and weaker rock with associated quartz veining was identified within the existing quarry, but this zone is thin and does not materially affect the resource present.

Extraction activity at the quarry ceased after a thin vein of naturally occurring asbestos (NOA) was exposed within the diorite at the quarry. This vein exposure has been contained and the associated risks to human health have been deemed by the Health and Safety Authority (HSA) to be acceptably low. Subsequent detailed visual assessment of fibrous coated discontinuities within the exposed diorite indicated that they were typically very thin (<5mm), with the quantity of fibrous material present within them described as rare / very rare.

2.3.2 Hydrology

Ballinclare Quarry lies entirely within the Water Framework Directive (WFD) Ovoca-Vartry Catchment and the Redcross Sub-Catchment. At the EPA sub-basin level, the quarry is located within the Potter's River catchment. Potter's River flows to the north and east of the quarry. As it does, it initially flows in an easterly direction to the north of the quarry before then turning to flow in a south-easterly direction beyond its eastern boundary. The river is located c. 300m from the site at its closest point. The Kilmacurra Stream is located c. 200m to the south of the site and flows in an easterly direction, to its confluence with the Potter's River.

The Irish Sea lies c. 7.5km east of Ballinclare Quarry. The coastal area of the Irish sea east of the site is designated a Special Area of Conservation (SAC) for species and habitat. The water in the Potters River is not abstracted for drinking water or recreational use (refer to www.catchments.ie). There are no recorded surface water abstractions from Potter's River in the vicinity of the site indicated by the EPA 2009 abstraction register (www.epa.ie).

Surface water run-off collecting in sumps at the site represent a mixture of groundwater and rainfall / direct run-off to the quarry. Testing of run-off indicates elevated levels of ammonia and orthophosphate and are attributed to local agricultural practices. Elevated levels of arsenic are present due to naturally occurring arsenic in the quarry.

Existing surface water quality surrounding the quarry site is generally good. Slightly elevated levels of nitrates recorded in test samples are attributed to local agriculture practices / land use. Elevated levels of mercury have been recorded in surface water surrounding the application site in the past, and it was previously considered that discharge from the quarry would, in effect, reduce the concentration of mercury in the Potters River.

2.3.3 Hydrogeology

Bedrock aquifer maps published on the GSI website provide a detailed classification of bedrock aquifer types and indicate that the diorite bedrock is classified as a poor aquifer (Pl) which is generally unproductive except in local zones. The closest classified sand and gravel aquifer is a locally important aquifer, located approximately 9km to the north of the application site and not connected to it.

The groundwater at the quarry site is indicated to be of good status according to the EPA Groundwater Body WFD Status Report for 2010-2015. The overall objective is to protect the water body and the groundwater body overall risk is described as "*Possibly at risk of not achieving good status*".

Ballinclare Quarry is located within the Wicklow Groundwater Body (GWB) which covers an area of 1,396km^2. It is described as being as a generally poorly productive aquifer, being composed primarily of low permeability rocks. There are large areas of the GWB where the rock is close to surface, which would suggest high potential recharge values, although recharge calculations must also consider the effect of rejected recharge by lower permeability rocks.

Mapping published by the GSI shows that the maximum recharge capacity at the site is 100mm/yr, although this can be expected to be further reduced by the typically low permeability of any landfill liner systems and inert waste which is likely to be used to backfill the existing quarry void. Aquifers within the GWB are generally unconfined.

The majority of groundwater flow is likely to occur within the weathered near surface horizon and principally within the range of groundwater fluctuation, this is typically 10m in thickness, although it is reported that the majority of flow occurs within the upper 3m of the aquifer. Flow is mostly along a weathered zone in the bedrock, with flow in a lateral direction towards rivers and springs. As well as discharging to overlying streams and rivers as baseflow, groundwater flow also discharges directly to the sea along the coast.

In some instances, a greater degree of structural deformation may provide a fracture network which will allow groundwater movement at greater depth. Deep-water strikes are encountered (between 10m and 40m bgl), but these are more isolated features along open fractures which allow groundwater flow. Only flow in isolated fractures is expected to occur below 30m depth (bgl).

Background groundwater quality samples taken from the three existing monitoring boreholes indicate that there are naturally elevated concentrations of arsenic and nickel in the groundwater. These are considered to reflect the natural chemistry of the diorite bedrock. There were detections of Nitrite at one monitoring well (GW1) during consecutive winters and it is considered that these were short term point sources from surrounding agricultural land-uses. Elevated levels of orthophosphates are also most likely attributable to agricultural practices in the local area. In general the background quality is good, with no evidence of significant anthropogenic sources of pollution beyond the impact of farming.

2.3.4 Ecological Designations

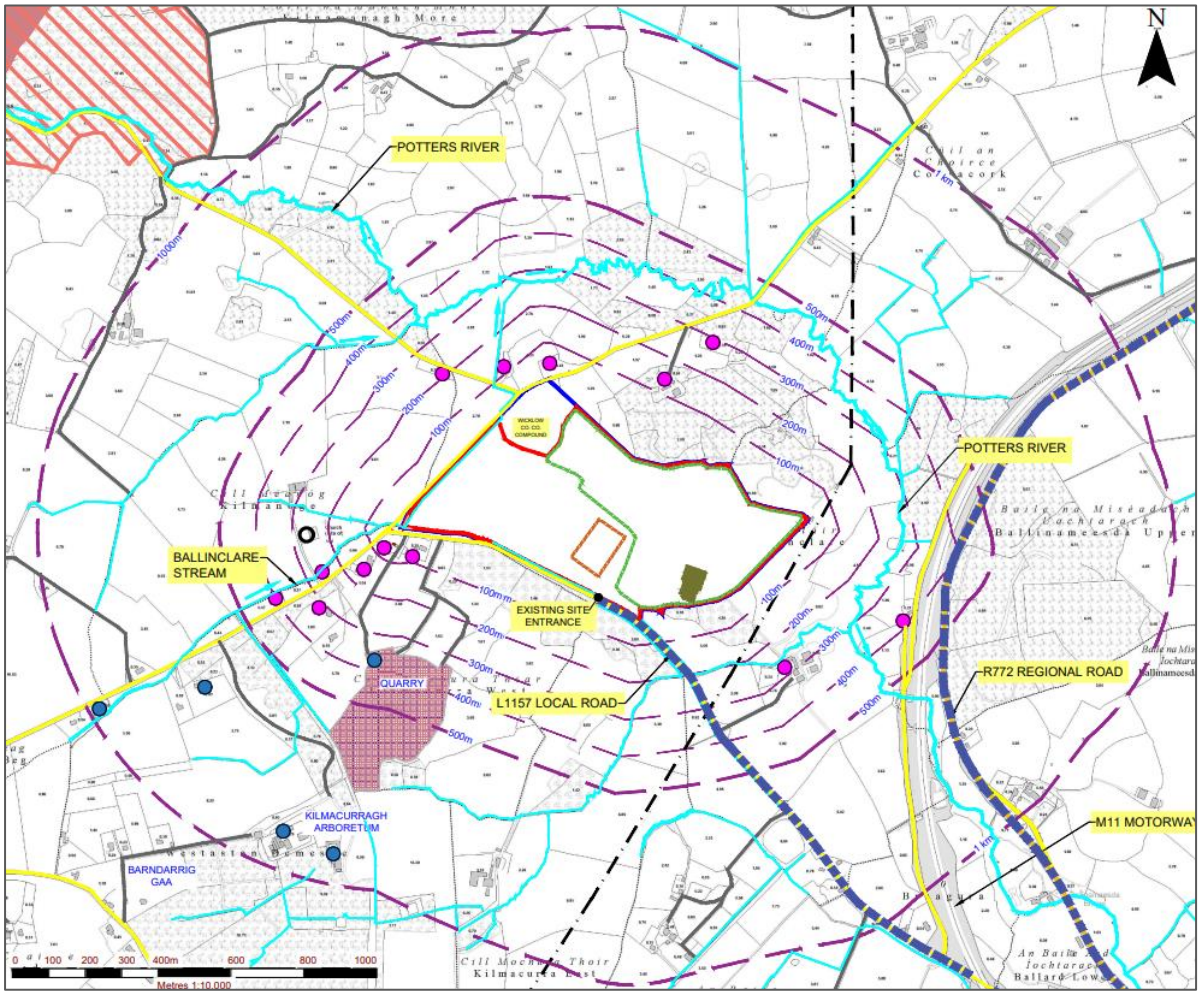
There are no designated nature conservation sites (Special Area of Conservation (SAC), Special Protection Area (SPA), Natural Heritage Area (NHA) or proposed Natural Heritage area (pNHA) within or immediately contiguous to Ballinclare Quarry.

The closest such sites are the Deputy's Pass Nature Reserve SAC (Site Code 000717) and the Glenealy Woods pNHA (Site Code 001756), which, at their closest point are located approximately 1.6 km and 1.1km to the north-west of the application site respectively. The next closest site is the Buckroney-Brittas Dunes and Fen SAC (Site Code 000729) some 7km southeast of the application site.

2.3.5 Occupied Houses

The principal sensitive receptors in the vicinity of the landholding boundary at Ballinclare Quarry are single, isolated rural dwellings those located to the south, west and north of the site, along the local county road network. Most housing in the study area has been established for several (>5) years. The locations of properties and commercial properties closest to the quarry site are indicated on the land use map provided in Figure 3 below (within 100m band and 1km offsets from the property boundary.

Figure 3
Surrounding Land Use



2.3.6 Employees or Other Site Users

Waste facilities pose hazards to site operatives such as the risk of hearing injury from noise sources, respiratory issues associated with dust inhalation, exposure to hazardous chemicals or injuries from contact with vehicles, plant or machinery.

2.3.7 Local Enterprise

Farm based businesses and related agricultural / food production activities are the principal source of economic activity in the area surrounding Ballinclare Quarry. There are also likely to be a number of small home or farm based rural enterprises operating out of local residential properties in the area (e.g. a yoga studio in the property immediately north of the application site, craft or horticultural based businesses).

There is another quarry located in Kilmacurra West, on the opposite side of the L1157 Local Road. This quarry is partially flooded at present and it is understood that it is not currently active that it has not been active for over 15 years. The online Irish Geological Heritage map indicates that Kilmacurra Quarry has been designated a County Geological Site (CGS).

2.3.8 Amenity Areas

The principal tourism / amenity facility in the vicinity of Ballinclare Quarry is the Kilmacurragh Botanic Gardens, an outpost of the National Botanic Garden in Glasnevin, Dublin, which is located just under 1km to the south-west of the site.

2.3.9 Summary of Sensitive Receptors

The principal sensitive receptors in the vicinity of the proposed inert landfill and materials recovery / recycling facility at Ballinclare Quarry (as identified above) comprise the following:

- Potter's River, approximately 200m south of the facility;
- Underlying (poor) aquifer in the diorite bedrock;
- Nearby residents, businesses and local amenity areas; and
- Employees and other site users;

For the purposes of this assessment, the most sensitive environmental receptor at or around the facility is deemed to be the Potter's River which flows to the east and south of the site. As noted previously, there are no designated nature conservation sites within 1km radius of the licensed facility.

2.3.10 Pathways

Potential noise and dust emissions from the proposed waste activities may be generated by HGV truck movements, by (mobile) earthworks plant and equipment engaged in haulage and landfill activities, by (fixed) crushers and the soil washing plant processing C&D waste / materials to produce recycled aggregate.

Air borne emissions of dust and noise transmission from the proposed facility have the potential to impact on the occupants of the nearest residential properties. In order to mitigate some of the potential impacts on residents of these properties, the Licensee will maintain existing perimeter screening berms / planting and provide an internal buffer zone between waste operations area(s) and the landholding boundary.

Surface Water

At present, active water management currently routes much surface water from the quarry site to the Ballinclare Stream to the west of it. Surface water run-off along with any groundwater inflow into the quarry void is currently pumped from two sumps in the base of the quarry and routed through a series

of treatment (settlement ponds) before being discharged to the Potters River via the Ballinclare Stream in accordance with the requirements of the existing discharge licence. In advance of landfilling, the quarry void is currently being dewatered and treated prior to its discharge off-site to the Ballinclare Stream. This will continue to be the active water management route for surface water run-off and groundwater ingress during the landfilling and recovery activities at the site.

The existing quarry discharge licence (Ref. No. WPL-116) provides for the discharge of treated water to the Potters River. Elevated levels of arsenic in site run-off are mitigated by way of a bespoke 'Siltbuster' water treatment system. Although the existing discharge licence will remain in force as the quarry is dewatered, it will be superseded by any waste licence issued in respect of the proposed waste facility.

Groundwater

The proposed inert landfill facility will be developed within a quarry excavated within diorite bedrock with no overlying superficial deposits. Although high rates of potential recharge would be expected in areas where there are very thin subsoils, the area around the quarry site accepts little recharge from precipitation as the diorite is considered to be a poor aquifer with low storativity, with the majority of potential recharge flowing over ground to surface water features or, where site infrastructure is in place, to collection points for treatment. In addition, the steep slopes across the GWB area also give rise to increased surface water run-off.

Any groundwater flow within the bedrock will be minimal due to its very low bulk permeability. Groundwater flow will therefore be primarily within the near surface weathered horizon, which based on groundwater level monitoring data is at least 5m - 6m in thickness, with the bulk of flow likely to occur within the upper 3m of the aquifer. Groundwater flow is in a broadly southerly to easterly direction towards the Kilmacurra Stream and Potters River with groundwater providing baseflow to these watercourses.

Following completion of landfilling and restoration of the site, groundwater pathways will follow the local topography and route groundwater in a south-easterly to easterly direction towards the Kilmacarra Stream and Potters River.

In the event that some surface contamination of near-surface soil or ground were to arise, it could introduce contaminants both to surface waters (via discharge) and/or groundwater (via recharge) and have an adverse impact on water quality and/or resource potential.

3.0 RISK ASSESSMENT

3.1 Introduction

The methodology for undertaking the Environmental Liability Risk Assessment (ELRA) in respect of the proposed inert landfill and materials recycling / recovery facility at Ballinclare Quarry comprises a number of discrete elements as outlined below:

(i) Risk Identification : A list of plausible risks for the waste activity is prepared, including potential impacts on surface water, groundwater, atmosphere, land, human health, natural habitats and protected species;

(ii) Risk Analysis : The risk analysis stage comprises establishment of risk classification criteria, followed by a risk analysis based on the selected criteria. Risk classification tables are used in order to evaluate and rank the risks relative to each other;

(iii) Risk Evaluation : The risk evaluation stage is used to assist in making decisions, using the outcomes of the risk analysis, in identifying and prioritising the identified risks for development of measures to minimise potential environmental impacts.

(iv) Risk Treatment: The risk treatment stage comprises identification and prioritisation of management and mitigation measures to reduce the risks identified in the risk evaluation process.

3.2 Risk Identification

Risks associated with the operation of the proposed waste facility were identified on foot of past visits and inspections by SLR Consulting Ireland.

It is expected that normal site operations, undertaken in accordance with procedures set out in Kilsaran's established Environmental Management System (EMS), will not generate any harmful leachate or effluent as all waste to be imported, handled, placed and managed at Ballinclare Quarry will be inert.

As operator, Kilsaran will be required to actively monitor and manage incoming wastes to confirm that only inert materials are accepted and managed at the facility. However, there is potential for non-inert or potentially hazardous materials to be hidden / obscured within incoming loads of inert compliant waste.

Storage of hydrocarbons in tanks and drums is identified as a potential hazard. At the quarry, fuel will be stored in the existing bunded fuel storage tanks located along the back (eastern) wall of the garage / workshop at the northern end of the site access road. The existing bunds have a retention volume of at least 110% of the largest tank. The fuel tanks are a potential source of contamination and the associated risks are considered in this risk assessment.

Refuelling of mobile plant and machinery at the proposed waste facility will generally take place over the existing concrete hardstanding area in front (east) of the fuel tank. Surface water run-off from the concrete hardstand area is captured by sub-surface drainage pipes and passed through an existing hydrocarbon interceptor before being discharged to ground via a soakaway / infiltration area.

On other occasions , and only when necessary, mobile plant will be refuelled directly by a fuel tanker over paved concrete surfaces. The location of the existing fuel tank, hardstand area and hydrocarbon interceptor are shown on the site layout drawing in Figures 4 and 5 overleaf.

Figure 4
Proposed Site Layout - Overview

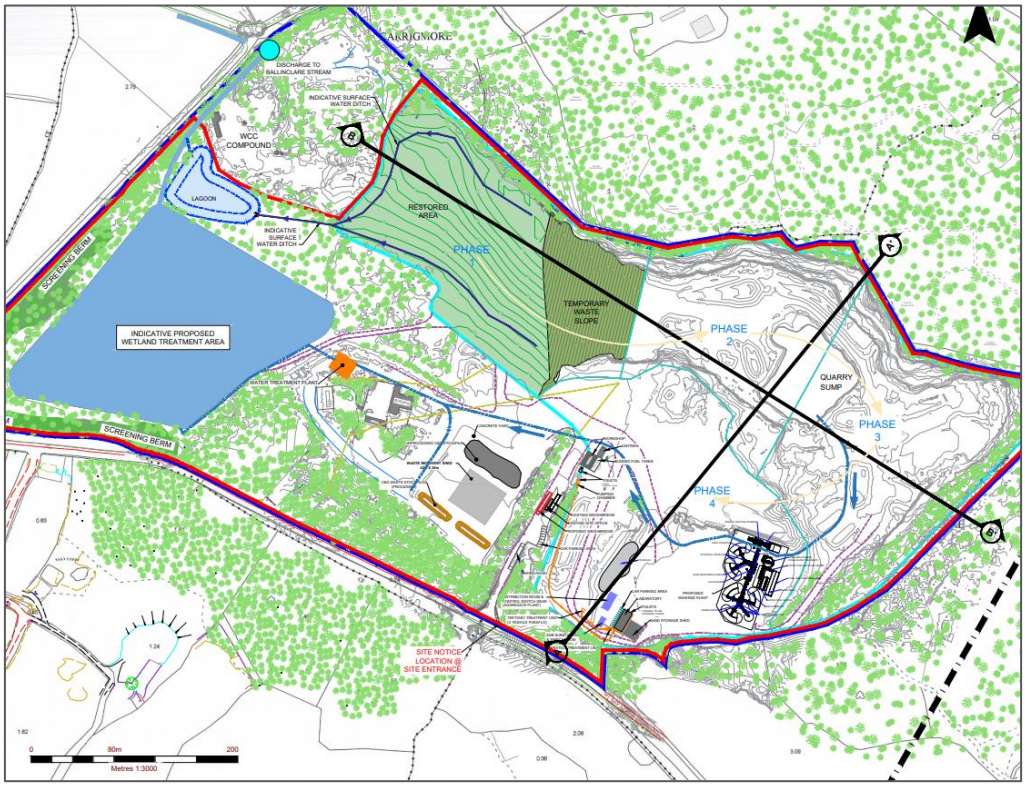
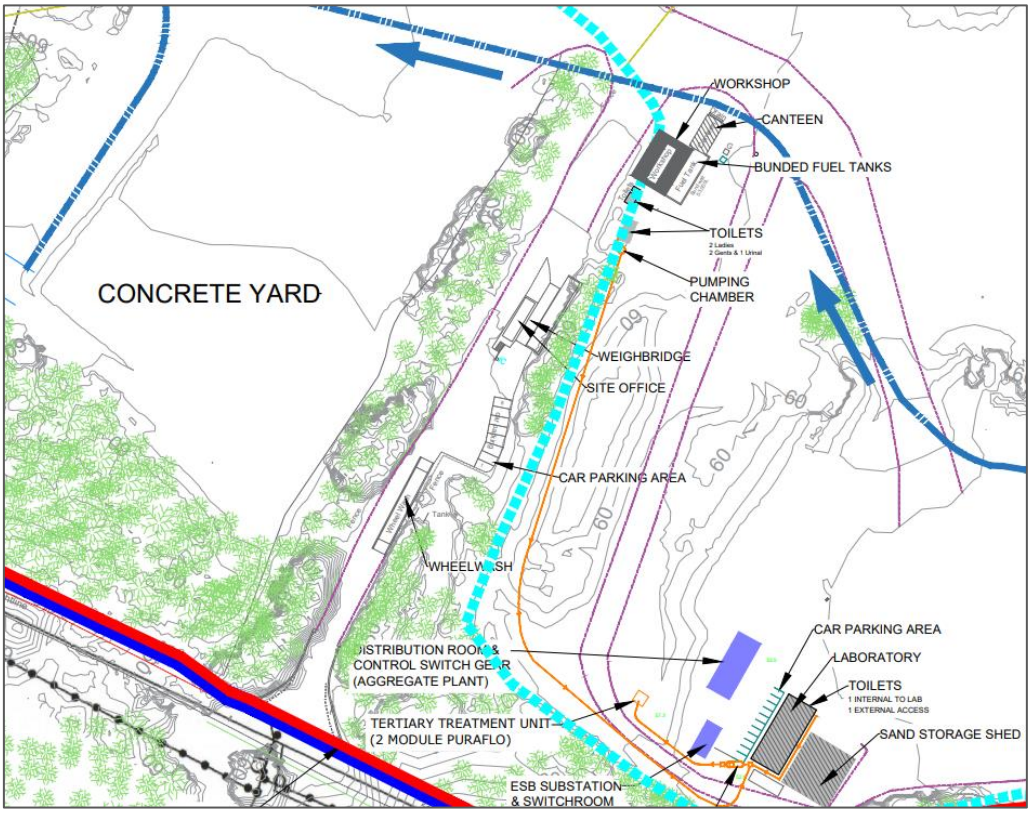


Figure 5
Proposed Site Infrastructure Area Layout



In addition to the fuel storage tank, it is likely that potentially hazardous substances will be stored in drums and tanks in the maintenance shed / workshop at the quarry. These would have the potential to cause environmental pollution if there is leak or spill.

The degree of impact would be dependent on the holding capacity of the impacted storage tank and/or drums. Small tanks can typically hold 1000 litres to 2,500litres of fuel oils while individual drums would typically hold around 200 litres of engine oils, transmission oils, hydraulic / hydrocarbon-based oils and gels for maintenance and operation of fixed plant / machinery and mobile plant. Oil tanks and drums in the maintenance shed / workshop will be protected against leaks by bunding. The concrete floor in the shed will provide further protection against ground ingress.

A leak from fuel tanks or pipelines, or spillage of hazardous substances, were they to arise, would run-off over ground and either infiltrate to ground and groundwater or be captured by the on-site surface water management system. Failure to contain such leaks and spills could result in contamination of surface water run-off or groundwater in bedrock beneath the site. Were such a scenario to materialise, the facility operator would be responsible for site clean-up and remediation.

Each of the potential environmental hazards and risks associated with the proposed landfillinh and materials recovery / recycling activities are addressed individually below:

All potential risks of environmental incidents or accidents are summarised in Table 1 below.

Table 1
Potential Risks Identified for Waste Management Activity

Risk ID	Process	Potential Risk
1	Stockpiling or Placement of Imported Non-Inert Materials	Excessive dust emissions from soil and C&D waste stockpiles, unprocessed and processed materials, placed materials and site activities generally
2		Excessive noise emissions from site activities
3		Stockpiling or placement of non-inert non-compliant waste; contamination of ground or groundwater / surface water
4	Fuel Storage and Handling	Leaks from pipelines; discharges to ground / groundwater and surface water;
5		Spill of stored hydrocarbons; discharges to ground / groundwater or surface water;
6	Storage and Handling of Hazardous Materials	Spill or leak of hazardous materials stored on site (gas-oil, hydraulic oil, engine oil, transmission oil, waste oil etc.); discharges to ground / groundwater or surface water
7	Leakages from Mobile Plant and Equipment	Spillage or leakage of fuel from HGVs, tipper trucks, bulldozers and other mobile site equipment; discharges to ground / groundwater or surface water
8	Weather	Flooding on site causing uncontrolled discharge

3.3 Risk Analysis

A list of plausible risks has been identified, which include abnormal but possible and plausible incidents occurring that could give rise to environmental liabilities. The risk analysis is based on the following likelihood and consequence risk classification tables, as outlined in Table 2 and Table 3 below. The risks identified are tabulated in Table 4 and assessed in terms of likelihood and consequence using the risk classification tables.

Table 2
Risk Classification Table – Likelihood

RATING	LIKELIHOOD	
	Category	Description
1	Very Low	Very low chance of hazard occurring
2	Low	Low chance of hazard occurring
3	Medium	Medium chance of hazard occurring
4	High	High chance of hazard occurring
5	Very High	Very high chance of hazard occurring

Table 3
Risk Classification Table – Consequence

RATING	LIKELIHOOD	
	Category	Description
1	Trivial	No impact or negligible change to the environment
2	Minor	Minor impact / localised or nuisance
3	Moderate	Moderate impact to environment
4	Major	Severe impact to environment
5	Massive	Massive impact to a large area, irreversible in medium term

Table 4
Risk Analysis

Risk ID	Process	Potential Risks	Environmental Effect	Consequence Rating	Basis of Consequence	Likelihood Rating	Basis of Likelihood	Risk Score (Consequence x Likelihood)
1	Stockpiling or placement of imported non-inert materials	Dust generation from stockpiles or placed materials	Reduction in air quality; inhalation of dust particles Potential health or nuisance impact	3	Slight increase in dust inhalation, principally by site users. Prolonged increase potentially damaging to health	2	Impact attenuated by separation distance, dust suppression, intervening vegetation and frequent seasonal rainfall. Standard dust suppression mitigation measures ensure no reduction in air quality	6
2	Stockpiling or placement of imported non-inert materials	Noise generation by moving plant and equipment	Increase in ambient noise on site and at nearby properties Potential health or nuisance impact	3	Slight increase in noise exposure, principally for site based operatives. Prolonged increase potentially damaging to health	2	Noise impact attenuated by separation distance and measures to limit emissions at source or screen over intervening distance.	6
3	Stockpiling or placement of imported non-inert materials	Contamination from non-inert non-compliant waste streams	Potential direct contamination of surface water via off-site discharges. Also potential for contamination of ground or underlying (poor) aquifer.	3	Finite volume of contaminated materials. The quarry floor will be protected by landfill clay liner. Bulk of surrounding landfill waste will comprise low permeability clay	2	Facility operator to apply measures to ensure all waste accepted at facility is inert, including establishing origin of incoming wastes. Interceptor and silt trap already installed	6

Risk ID	Process	Potential Risks	Environmental Effect	Consequence Rating	Basis of Consequence	Likelihood Rating	Basis of Likelihood	Risk Score (Consequence x Likelihood)
4	Fuel Storage and Handling	Leaks from pipelines; discharge to ground / groundwater	Potential direct contamination of surface water via off-site discharges. Also potential for contamination of ground or underlying (poor) aquifer.	4	Potential for large volume loss.	2	Plant and equipment regularly maintained and inspected. Pipelines regularly inspected and tested. Interceptor and silt trap installed	8
5	Fuel Storage and Handling	Spill of hydrocarbons stored on site in fuel tanks and drums to surface water or ground / groundwater	Potential direct contamination of surface water via off-site discharges. Also potential for contamination of ground or underlying (poor) aquifer.	4	Potential for large volume loss.	2	Plant and equipment regularly maintained and inspected. Static tanks are fully bunded. Tanks and containment bunds regularly inspected and tested.	8
6	Storage and Handling of Hazardous Materials	Spill or leak of hazardous materials stored on site (gas-oil, hydraulic oil, engine oil, waste oil etc.); discharge to surface water or ground / groundwater	Potential direct contamination of surface water via off-site discharges. Also potential for contamination of ground or underlying (poor) aquifer.	4	Loss of hazardous and persistent material. Finite volumes stored.	2	Materials stored in maintenance shed. Storage containers and drums placed on bunded pallets. Tanks, drums and pallets regularly inspected and tested. Interceptor and silt trap installed	8
7	Traffic	Spillage or leakage of fuel from HGVs, trucks and mobile site equipment. Spillage during refuelling Discharge to ground and groundwater	Potential direct contamination of surface water via off-site discharges. Also potential for contamination of ground or underlying (poor) aquifer.	3	Losses finite (low volume) and dispersed.	2	Plant and equipment regularly maintained and inspected. Pipelines regularly inspected and tested.	6

Risk ID	Process	Potential Risks	Environmental Effect	Consequence Rating	Basis of Consequence	Likelihood Rating	Basis of Likelihood	Risk Score (Consequence x Likelihood)
8	Weather	Flooding on site causing uncontrolled discharge	Potential direct contamination of surface water via off-site discharges. Also potential for contamination of ground or underlying (poor) aquifer.	3	Potential for large volume loss and impact due to elevated suspended solids	1	No history of flooding at the licensed site. Or immediate vicinity thereof.	3

3.4 Risk Evaluation

The environmental risks identified above are re-tabulated below in Table 5 to assist in the prioritisation for risk treatment purposes

Table 5
Risk Evaluation Table

Risk ID	Process	Potential Risks	Consequence Rating	Likelihood Rating	Risk Score (Consequence x Likelihood)
4	Fuel Storage and Handling	Leaks from pipelines; discharge to ground / groundwater	4	2	8
5	Fuel Storage and Handling	Spill of hydrocarbons stored on site in fuel tanks to surface water or ground / groundwater	4	2	8
6	Storage and Handling of Hazardous Materials	Spill or leak of hazardous materials stored on site (gas-oil, hydraulic oil, engine oil, transmission oil, waste oil etc.), discharge to surface water or ground / groundwater	4	2	8
1	Stockpiling or placement of imported non-inert materials	Dust generation from stockpiles or placed materials	3	2	6
2	Stockpiling or placement of imported non-inert materials	Noise generation by moving plant and equipment	3	2	6
3	Stockpiling or placement of imported non-inert materials	Contamination of ground or groundwater by non-inert non-compliant waste	3	2	6
7	Traffic	Spillage or leakage of fuel from HGVs, tipper trucks, bulldozers and other mobile site equipment. Spillage during refuelling. Discharge to surface water or ground / groundwater	3	2	6
8	Weather	Flooding on site causing uncontrolled discharge	3	1	3

The risk matrix is displayed in Table 6 below. In line with the EPA Guidance, the risks have been colour coded in the matrix to provide a broad indication of the critical nature of each risk to facilitate prioritisation of risks for treatment. The matrix allows risks to be easily displayed and prioritised.

Table 6
Risk Matrix

Likelihood							
	Very High	5					
	High	4					
	Medium	3					
	Low	2			1, 2 ,3, 7	4, 5, 6	
	Very Low	1			8		
			Trivial	Minor	Moderate	Major	Massive
			1	2	3	4	5
			Consequence				

The risk matrix indicates that five of the identified risks lie in the green zone, indicating the need for continuing awareness and regular ongoing monitoring. Three of the risks lie within the amber zone, requiring treatment through mitigation or management action. These are Risk ID 4 – Leaks from pipelines, Risk ID 5 – Spill of hydrocarbon stored on site at static and mobile fuel tanks and Risk ID 6 – Spill or leak of hazardous materials stored on site.

3.5 Risk Treatment

The output of the risk treatment process is the development of a statement of measures to be taken to minimise the environmental risk of the activity. The risk reduction due to established and/or planned mitigation measures is indicated in Table 7.

Table 7 allocates identified mitigation measures to a 'risk owner'. Kilsaran will maintain and update a version of this table to inform its Risk Reduction Programme for the proposed waste facility. The responsibility may differ from that indicated below, depending on the staffing complement and variations in on-site activities / outputs.

The Risk Reduction Programme is a dynamic process that will be regularly reviewed and updated to reflect changes that occur at the facility. New risks may emerge with new processes or new methods of working. Additional hazards can arise from the use of new materials for maintenance or fuelling at the facility. Additional mitigation measures can become available or better techniques developed. The staff structure can change and new responsibilities allocated to the site management team.

Table 7
Risk Reduction due to Existing Mitigation Measures

Risk ID	Potential Risk	Risk Score	Mitigation Measures to be Taken	Outcome	Action	Date for Completion	Owner / Contact Person
4	Leaks from pipelines; discharge to ground and groundwater	8	Spill kits comprising containment booms and absorbent materials readily accessible on site. Regular visual inspection and integrity testing of mobile plant and equipment undertaken to identify small or undetected leaks	Reduced likelihood of leaks to ground / groundwater	Ongoing inspection and monitoring	Ongoing	Location Manager
5	Spill of hydrocarbons stored on site in fuel tanks ; discharge to surface water or ground / groundwater	8	Regular tank and bund integrity assessments undertaken. Tank and bund are visually inspected annually. Bund integrity test undertaken every three years. Fuel storage drums and containers to be inspected at least quarterly. Level alarm installed in storage tank. Re-fuelling to take place over concrete paved surface. Sub-surface drainage and existing treatment infrastructure (interceptor) to reduce the scale and impact of a potential fuel leak or spill. Spill kits available in workshop for the purpose of containing minor leaks or spills Emergency Response Procedures and Plans are in place detailing the actions should a major leak or spillage event occur.	Reduced likelihood of spills to surface water and ground / groundwater	Ongoing inspection and monitoring	Ongoing	Location Manager

Risk ID	Potential Risk	Risk Score	Mitigation Measures to be Taken	Outcome	Action	Date for Completion	Owner / Contact Person
6	Spill or leak of hazardous materials stored on site	8	All hazardous fluids and materials stored at the on-site maintenance garage in accordance with regulations until they are either recovered (treated) or disposed of at an appropriate off site waste facility. All tanks, drums and containers subject to routine inspection and maintenance as part of scheduled site Inspections (at least quarterly). Hydraulic oil, transmission fluid and hydrocarbon fluids and gels etc. stored on bunded pallets in workshop with concrete floor to prevent infiltration to ground if materials spill. Material Safety Data Sheets held for all hazardous liquids stored on site. Spill kits available in workshop for the purpose of containing minor spills. Emergency Response Procedures and Plans in place detailing the actions to be implemented should a spillage event occur. Emergency Response Training is carried out as part of Environmental Awareness Training for all site based operatives and managers. Material storage procedure in place and integrated into Environmental Awareness Training outlining how hazardous materials are stored to prevent environmental pollution.	Reduced likelihood of spills to surface water and ground / groundwater	Ongoing inspection and monitoring	Ongoing	Facility Manager

Risk ID	Potential Risk	Risk Score	Mitigation Measures to be Taken	Outcome	Action	Date for Completion	Owner / Contact Person
			Site inspection checklist calls up checks on spill containment measures, content of spill kits, hazardous materials storage, bunds, spill trays, surface water infrastructure, hydrocarbon interceptor, etc.				
1	Dust generation from stockpiles or placed materials	6	Surfaces damped down during prolonged dry spells to keep yards and roads dust free. Wheelwash / vehicle wash facilities provided along egress route maintained in working order. Traffic movements after the wheelwash to run over paved surfaces to minimise mud pick-up. Dusk masks available for employees and visitors, as necessary.	Reduced likelihood of excessive dust emissions	Ongoing inspection and monitoring	Ongoing	Facility Manager
2	Noise generation by moving plant and equipment	6	Employees and visitors issued with ear protectors, as necessary. Where monitoring indicates that noise emissions from the facility are excessive, the Operator to employ further mitigation in the form of improved working practices, noise screening and/or reduced sound output from (or improved performance of) plant and machinery.	Reduced likelihood of excessive noise emissions.	Ongoing inspection and monitoring	Ongoing	Facility Manager

Risk ID	Potential Risk	Risk Score	Mitigation Measures to be Taken	Outcome	Action	Date for Completion	Owner / Contact Person
3	Contamination from non-inert non-compliant waste	6	Operator to design and implement robust waste acceptance procedures which ensure that all wastes accepted at the facility are inert. Operator to confirm customer business activities and credentials prior to issuing any authorisation to deliver waste to facility Operator to establish source / site of origin (and development history) for each waste consignment accepted at the facility.	Reduced likelihood of contaminated waste import	Ongoing inspection and monitoring	Ongoing	Facility Manager
7	Spillage or leakage of fuel from HGVs, tipper trucks, bulldozers and other mobile site equipment.	6	Re-fuelling over concrete paved surfaces to minimise potential for infiltration to ground / groundwater.	Reduced likelihood of spills to surface water or ground / groundwater	Ongoing inspection and monitoring	Ongoing	Facility Manager
7	Spillage during refuelling; discharge to ground and groundwater	6	Spill kits comprising containment booms and absorbent materials readily accessible on site. Regular visual inspection and integrity testing of mobile plant and equipment undertaken to identify small or undetected leaks.	Reduced likelihood of spills to surface water or ground / groundwater	Ongoing inspection and monitoring	Ongoing	Facility Manager
8	Flooding on site causing uncontrolled discharge	3	Monitoring of extreme weather events. Revise emergency response procedures as required.	Increased awareness of response procedures	Revision of emergency response procedures.	Ongoing	Facility Manager

4.0 IDENTIFICATION OF PLAUSIBLE WORST-CASE SCENARIO

The ELRA for the planned waste activities at Ballinclare Quarry has identified a small number of risks with a major consequence and these formed the basis of further assessment to identify the plausible worst-case scenario.

This assessment determined that the most plausible worst-case environmental scenarios relate to the spill / leak of hydrocarbons stored on site in fuel tanks impacting on surface water and groundwater (ID 4 and ID 5) and spillage / leakage of hazardous materials stored on site that could also impact surface water or groundwater (ID 6).

Under the worst case scenario, it is assumed that existing / proposed mitigation measures are either:

(a) not in place, or

(b) in place, but are either not implemented or fail to function as intended.

If this scenario was to transpire, it is considered that it would not precipitate any other environmental incidents, nor would it increase the likelihood that any other identifiable environmental risks would occur.

It is noted that given the (inert) nature of the wastes being handled and the location and configuration of existing office and storage facilities on site, the risks associated with a fire outbreak are considered to be minimal. Risk of injury or death to employees or the public as a result of a fire would be covered by Employer's Liability and Public Liability insurance cover. Any fire affecting offices or plant / equipment would be covered by general insurance.

It is considered that any potential injuries or illnesses caused to site employees or the public by dust or noise emissions would be covered under Employer's Liability and Public Liability insurance cover. The risk of occurrence of these problems is considered very low, provided mitigation measures outlined above are fully implemented.

5.0 QUANTIFICATION AND COSTING

This risk assessment has determined that the most plausible worst-case environmental scenarios at the proposed inert landfill land materials recovery / recycling facility at Ballinclare Quarry relate to the spillage / leakage of hydrocarbons (ID 4 and ID 5) and/or hazardous materials (ID 6) stored on site that could impact on off-site discharges to surface waters and to the underlying groundwater table (albeit it is designated a poor aquifer). Given the potential for a large volume loss, it is considered that loss of fuel from a filled fuel storage tank (ID 5) presents the greatest level of environmental risk for the proposed waste activities.

The plausible worst-case scenario with the highest cost (Risk ID 5) is quantified and costed in this Section and in particular, in Table 7 below. For the purposes of this exercise, it is assumed that failure of the largest tank occurs and is not immediately seen or detected. The tank is located to the side of the existing workshop / maintenance shed, immediately to the south of the existing quarry void and proposed landfill footprint (and north of the proposed soil washing / aggregate recycling area). Although it has a capacity of 53,000 litre and holds diesel (gasoil) and will be used to fuel on-site plant and machinery, it is expected that it will not hold more than 10,000 litres of fuel at any one time. It is protected against damage and leaks by a surrounding concrete bund.

As the area around the fuel storage is paved, it is considered that much of the fuel release would run over ground, at least initially, as the paved surface would largely impede any percolation or recharge to groundwater. Thereafter it would either run over ground or through the upper weathered zone in the bedrock, to collect in a sump at a low point in the landfill area (quarry void), where it would either rest or be potentially lifted by an automated pump to the surface water treatment (wetland) area on the western side of the facility.

Although it is likely that quite a high proportion of leaked fuel could be captured by the on-site surface water management network / system, it is considered prudent in costing up a worst-case scenario to provide for some limited infiltration to unpaved ground and to incorporate some financial provision for remediation of ground and/or groundwater contamination. Coupled with this, it is conservatively assumed that 100% of the released fuel is discharged to on-site drainage systems and wetland area.

It is further assumed, for costing purposes that under this scenario, up to 50% of the spilled hydrocarbons would be discharged off-site, past the existing discharge point to the Ballinclare Stream and Potter's River further downstream. Existing surface water quality surrounding the quarry is generally good., albeit slightly elevated levels of nitrates recorded in the past have been attributed to local agriculture / land-use practices, together with elevated levels of mercury.

Although the Buckroney-Brittas Dunes and Fen Special Area of Conservation (SAC) (Site Code 000729) is located approximately 7km southeast and downstream of Ballinclare Quarry, the Natura Impact Statement prepared in respect of the proposed development concluded that it would affect the key species and key habitats of the SAC as all the designated habitats are terrestrial and not fed or dependent upon the flows or water from the Potters River. As such, and for the purposes of this assessment, the SAC is not identified as a potentially sensitive receptor.

The water in the Potters River is not abstracted for drinking water or recreational use. (www.catchments.ie). There are no recorded surface water abstractions from Potter's River in the vicinity of the application site indicated by the EPA abstraction register (www.epa.ie).

In the event that the worst-case scenario was to transpire, the associated land and groundwater remediation costs which are likely to be incurred are identified, quantified and costed in Table 8 in order to establish an appropriate level of financial provisioning to be made in respect of the waste facility.

The remediation response to a large fuel spill is likely to comprise the following:

(i) mobilisation of emergency response contractor to site for immediate spill containment and site clean-up;
(ii) collection and removal off-site (as contaminated waste) of captured fuels, absorbent materials, impacted soils and contaminated surface waters (from wetland area), all of which are assumed to be hazardous;
(iii) construction of a temporary bunded facility to store any excavated materials prior to removal off-site;
(iv) the cost of ground investigation to delineate the extent of the ground impacted by the spill;
(v) the cost of constructing and commissioning any abstraction well(s) into the bedrock;
(vi) installation and commissioning of an on-site treatment system to pump contaminated groundwater out of ground and pass it through oil interceptor and carbon filter and discharge back to ground;
(vii) maintenance costs for product recovery system, to include consultancy costs, regular daily visits, laboratory analyses, emptying and disposal of recovered products, changing and disposal of carbon filter material.
(viii) provision for placement of booms across the Potters River for an extended period, river bank clean-up, restocking, remediation / replanting and any consequential losses to cattle.

The cost of excavating and removing / remediating contaminated soil or groundwater material is very much dependent on the volume and degree / nature of any contamination which might occur or be encountered.

As a worst-case scenario, we have accordingly recommended preliminary provision of **€1,064,400** for remediation / evacuation of contaminated groundwater and impacted surface watercourses in the event of a large-scale fuel spillage (inclusive of 20% contingency). It should however be recognised that following implementation of all mitigation measures (principally provision of a bunded containment area), the probability of such an occurrence materialising is considered very low.

Table 8
Quantification and Costing of Plausible Worst-Case Scenario

Task	Description	Quantity (No.)	Measurement Unit	Unit Rate (€)	Cost (€)	Source of Unit Rate Estimate
Response to: Risk ID 5 Spill of gasoil stored from on-site 53,000L fuel tank	Mobilising emergency response contractor to site for spill containment and site clean-up	5	Days	4,500	22,000	SLR Consulting Ireland
	Exploratory trial pit excavation	10	No.	300	3,000	SLR Consulting Ireland
	Soil quality testing (incl. leachate tests)	20	Sample	250	5,000	SLR Consulting Ireland
	Drill and install groundwater monitoring wells around settlement pond / affected area to average depth of 30m	8	No.	1,250	10,000	SLR Consulting Ireland
	Purging and sampling of wells over five years, with following frequencies: Year 1 –monthly : Year 2 – bimonthly Years 3-5 - quarterly	30	Visit	1,500	45,000	SLR Consulting Ireland
	Testing of groundwater samples (8 No.) from wells over 30 rounds	240	Sample	200	48,000	SLR Consulting Ireland
	Construction of temporary lined contaminated material holding area	1,000	m^3	60	60,000	SLR Consulting Ireland
	Excavation of contaminated ground (soil / rock)	1,000	Tonne	7.50	7,500	SLR Consulting Ireland
	Removal and disposal off site (as hazardous waste) of up to 1,000 tonnes of contaminated material, captured fuel and absorbent materials	1,000	Tonne	180	180,000	SLR Consulting Ireland

Task	Description	Quantity (No.)	Measurement Unit	Unit Rate (€)	Cost (€)	Source of Unit Rate Estimate
Response to: Risk ID 5 Spill of gasoil stored from on-site 53,000L fuel tanks	Transport of contaminated material - up to 1,000 tonnes (excavated ground, captured fuel and absorbent materials)	1,000	Tonne	20	20,000	SLR Consulting Ireland
	Source and place uncontaminated soil to backfill excavated voids	1,000	Tonne	10	10,000	SLR Consulting Ireland
	Installation, operation and maintenance of pump and treat system for groundwater contamination	1	Year	100,000	100,000	SLR Consulting Ireland
	Environmental Consultancy Costs (reporting, supervision, licence surrender)	40	Days	750	30,000	SLR Consulting Ireland
	Installation, operation and maintenance of booms at river over extended period	1	Year	120,000	120,000	SLR Consulting Ireland
	Allowance for remedy of any consequential losses arising from impact to stream (e.g. ecological survey, restocking, river bank clean-up, replanting, livestock impact)	1	Unit	200,000	200,000	SLR Consulting Ireland
	Inspection and testing of river daily for one week following spill and as follows: - Weekly for 11 weeks - Monthly for 9 months - Biannually for 4 years	33	Visit	500	16,500	SLR Consulting Ireland
Total (€)					**€887,000**	
20%Contingency					€177,400	
Final Total (€)					**€1,064,400**	

6.0 CONCLUSIONS

6.1 Environmental Liabilities

A preliminary Environmental Liabilities Risk Assessment has been carried out for the planned landfill and materials recovery / recycling facility at Ballinclare Quarry. The ELRA has been prepared in accordance with the EPA publication *Guidance on Assessing and Costing Environmental Liabilities (2014).*

Fuel / hazardous materials storage and handling (Risk ID 4, Risk ID 5 and Risk ID 6) has been identified as the highest environmental risks at the facility. Due to the potential for large volume loss for Risk ID5, it is assumed for the purposes of assessing potential environmental liability that the worst-case scenario would involve a leak or spill from the existing fuel storage tank / bunded fuel storage area with potentially major consequences for the Ballinclare Stream and Potters River and any groundwater in the underlying (poor) aquifer.

If this scenario was to transpire, it is considered that it would not precipitate any other environmental incidents, nor would it increase the likelihood that any other identifiable environmental risks would occur.

The environmental liability has been assessed on the basis of the worst-case scenario outlined above. Were it to materialise, the maximum environmental liability which could be incurred is estimated to be of the order of **€1,433,400** (inclusive of 20% contingency).

6.2 Financial Provision for Environmental Liabilities

Kilsaran will provide insurance cover to cover potential environmental liabilities in respect of the proposed waste facility at Ballinclare.

Should the Agency raise any concerns in respect of any standard clauses or provisions in the insurances (such as limits on cover, policy exclusions or deductibles), the company will endeavour to modify the policy terms to satisfy the Agency's specific requirements in respect of provision for potential environmental liabilities (assuming it is practicable and cost effective to do so).

7.0 CLOSURE

This report has been prepared by SLR Consulting Ireland (SLR) with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the Client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of Kilsaran Concrete Unlimited Company; no warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

EUROPEAN OFFICES

United Kingdom

AYLESBURY
T: +44 (0)1844 337380

BELFAST
T: +44 (0)28 9073 2493

BRADFORD-ON-AVON
T: +44 (0)1225 309400

BRISTOL
T: +44 (0)117 906 4280

CAMBRIDGE
T: + 44 (0)1223 813805

CARDIFF
T: +44 (0)29 2049 1010

CHELMSFORD
T: +44 (0)1245 392170

EDINBURGH
T: +44 (0)131 335 6830

EXETER
T: + 44 (0)1392 490152

GLASGOW
T: +44 (0)141 353 5037

GUILDFORD
T: +44 (0)1483 889800

LEEDS
T: +44 (0)113 258 0650

LONDON
T: +44 (0)203 691 5810

MAIDSTONE
T: +44 (0)1622 609242

MANCHESTER
T: +44 (0)161 872 7564

NEWCASTLE UPON TYNE
T: +44 (0)191 261 1966

NOTTINGHAM
T: +44 (0)115 964 7280

SHEFFIELD
T: +44 (0)114 245 5153

SHREWSBURY
T: +44 (0)1743 23 9250

STAFFORD
T: +44 (0)1785 241755

STIRLING
T: +44 (0)1786 239900

WORCESTER
T: +44 (0)1905 751310

Ireland

DUBLIN
T: + 353 (0)1 296 4667

France

GRENOBLE
T: +33 (0)4 76 70 93 41